

AMENDMENTS TO THE DRAWINGS

The attached sheet of drawings includes changes to Figures 23, 24 and 25. Figures 23, 24, and 25 are now designated as Prior Art.

Attachment: Replacement Sheet

REMARKS/ARGUMENTS

Reconsideration and withdrawal of the rejections of and objection to of the instant application are respectfully requested in view of the following remarks, which place the application into condition for allowance.

I. STATUS OF THE CLAIMS AND FORMAL MATTERS

Claims 1-4, 11 and 12 are pending in this application. Claims 5-10, 13 and 14 were withdrawn; claim 4 is objected to; and claims 1-3, 11 and 12 are rejected in the Non-Final Office Action mailed on November 30, 2007. Claim 11 has been amended in this response. Support for this amendment can be found throughout the specification as originally filed, specifically in Fig. 13 and paragraph [0183] of the application as originally filed.

No new matter has been introduced by this amendment. Changes to the claims are not made for the purpose of patentability within the meaning of 35 U.S.C. §101, §102, §103, or §112. Rather, these changes are made simply for clarification and to round out the scope of protection to which Applicants are entitled.

It is submitted that the claims, herewith and as originally presented, are patentably distinct over the prior art cited in the Office Action, and that these claims were in full compliance with the requirements of 35 U.S.C. § 112. The amendments of the claims, as presented herein, are not made for purposes of patentability within the meaning of 35 U.S.C. §§§§ 101, 102, 103 or 112.

II. THE REJECTIONS UNDER 35 U.S.C. § 103(a)

Claims 1-3, 11 and 12 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 6,468,906 to Chan et al. (hereinafter "Chan") in view of U.S. Patent No. 6,861,758 to Jan (hereinafter "Jan"). The rejections are traversed as set forth below.

Amended claim 1 recites, *inter alia*:

“... at least two wiring layers, each formed in a wiring groove formed in a corresponding insulating film; and

a via contact embedded in a via hole formed in an insulating film formed between the at least two layers and made of a metal wiring material which is the same as that of the at least two wiring layers,

wherein the metal wiring material of the via contact contains an additive which is not contained in the metal wiring materials of the at least two wiring layers ... (emphasis added)

Applicants agree with the Office Action of November 30, 2007 that states that “Chan et al. does not disclose an additive within the metal wiring of the via contact.” (see Office Action, paragraph 6 on page 4) and therefore, will not further discuss Chan. Furthermore, Applicants submit that Jan does not teach or disclose the features of claim 1.

Specifically, Jan in Figures 6-9 and column 4, lines 22-58 discloses:

A dielectric layer 134 having an opening 136 is provided on an electrically conductive layer 132 as shown in FIG. 6. Dopant 138 is implanted to the electrically conductive layer 132 “before” embedding a conductive material in the opening 136 as shown in FIG. 7. Then, the electrically conductive material 142 is embedded in the opening 136 as shown in FIG. 8. After that, a first doped region 140 and a second doped region 144 are formed by annealing.

Accordingly, Jan discloses that the additive implanted into the electrically conductive layer 132, which is a lower wiring, is diffused in the via provided on the electrically conductive layer 132, and then in the electrically conductive material 142, which is an upper wiring, provided on the via. In particular, column 4, lines 41-47, of Jan states:

“FIG. 9 shows first doped region 140 in electrically conductive layer 132 and second doped region 144 in electrically conductive material 142. First doped region 140 and second doped region 144 are formed by annealing electrically conductive layer 132 after dopant 138 has been implanted into electrically conductive layer 132. Dopant 138 is able to diffuse to form first doped region 140 and second doped region 144. One advantage of this embodiment is that current can flow in either direction through the structure of FIG. 9 without causing electromigration of the material which comprises electrically conductive layer 132 and electrically conductive material 142.”

In Jan, as shown in FIG. 9, the additive is included in the electrically conductive layer 132 and the electrically conductive material 142. Therefore, Jan cannot have the feature of the present invention “wherein the metal wiring of the via contact contains an additive which is not contained in the metal wiring materials of the at least two wiring layers.”

In addition, in Jan, the additive is diffused from the lower wiring to the upper wiring, therefore, the technical idea taught in Jan is allowing a via to surely contain an additive. There is

no motivation to make a configuration in which the additive is not contained in the lower wiring and is contained in the via. Consequently, the feature of the present invention “wherein the metal wiring of the via contact contains an additive which is not contained in the metal wiring materials of the at least two wiring layers” cannot be attained even by combining Jan and Chan.

The Examiner rejects claim 11 as being unpatentable over Chan in view of Jan. However, claim 11 should not be rejected for the same reasons described as to claim 1.

Claim 11 recites “a via contact ... which contains an additive which is not contained in the first wiring material of the first wiring layer...” For the reasons stated above, Jan does not teach this feature or an additive not contained in a lower wiring but contained in a via contact.

Claims 2, 3 and 12 are dependent claims. Since the independent claims they depend from are not obvious from neither Chan nor Jan as set forth above, claims 2, 3, and 12 are not obvious, and hence, patentable. Claim 4, which was only objected to as being dependent on rejected claim 1, should also be patentable.

Based on the foregoing reasons, Applicants respectfully submit that independent claim 1 patentably distinguishes over Chan in view of Jan and is therefore allowable. Independent claim 11 is similar in scope to claim 1 and therefore is also allowable.

CONCLUSION


In view of the foregoing amendments and remarks, all of the claims in this application are in condition for allowance and Applicants respectfully request early passage to issue of the present application.

In the event the Examiner disagrees with any of the statements appearing above with respect to the disclosures in the cited references, it is respectfully requested that the Examiner specifically indicate the portions of the reference, or references, providing the basis for a contrary view.

Please charge any additional fees incurred by reason of this response and not paid herewith to Deposit Account No. 50-0320.

Respectfully submitted,
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